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Datasheet for the decision of 7 January 2016

Case Number: T 0266/11 - 3.2.06

Application Number: 03767273.0

Publication Number: 1542818

IPC: B21J15/24, B21J15/28

Language of the proceedings: EN

Title of invention:
SYNCHRONIZED RIVET GUN SYSTEM

Patent Proprietor:
The Boeing Company

Opponent:
Airbus Operations GmbH/Airbus Operations SAS (FR)/
Airbus Operations Limited (GB) /
Airbus Operations S.L. (ES)/Airbus SAS (FR)

Headword:

Relevant legal provisions:
EPC 1973 Art. 54, 56
EPC Art. 69(1)

Keyword:
Novelty - main request (no)
Inventive step - auxiliary request (yes)

Decisions cited:

Catchword:

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Case Number: T 0266/11 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 7 January 2016

Appellant: (Opponent)	Airbus Operations GmbH/Airbus Operations SAS (FR)/ Airbus Operations Limited (GB) / Airbus Operations S.L. (ES)/Airbus SAS (FR) Kreetslag 10 21129 Hamburg (DE)
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Respondent: (Patent Proprietor)	The Boeing Company 100 North Riverside Chicago, IL 60606-1596 (US)
Representative:	Land, Addick Adrianus Gosling Arnold & Siedsma Bezuidenhoutseweg 57 2594 AC Den Haag (NL)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 9 December 2010 rejecting the opposition filed against European patent No. 1542818 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	M. Harrison
Members:	M. Hannam
	W. Ungler

Summary of Facts and Submissions

I. An appeal was filed by the appellant (opponent) against the decision of the opposition division to reject the opposition against European patent No. 1 542 818. The appellant requested that the decision be set aside and the patent be revoked.

II. In its letter of response, the respondent (proprietor) requested that the appeal be dismissed, alternatively that the patent be maintained in amended form according to one of its auxiliary requests 1 to 3.

III. The following documents are relevant for the present decision:

D1 US-A-3 559 269
D3 EP-A-0 545 638

IV. The Board issued a summons to oral proceedings including a communication containing its provisional opinion, in which it indicated *inter alia* that novelty of the subject-matter of claim 1 of the main request with respect to D1 would be a topic of discussion.

V. Oral proceedings were held before the Board on 7 January 2016, during which the respondent withdrew auxiliary requests 1 to 3 and filed a new auxiliary request 1.

The appellant requested that the decision under appeal be set aside and the European patent No. 1 542 818 be revoked.

The respondent requested that the appeal be dismissed,

alternatively that the patent be maintained in amended form according to auxiliary request 1.

VI. Claim 1 of the main request reads as follows (with paragraph annotation as used by the appellant included for ease of reference):

"1.1 A method for riveting comprising:
1.2 applying a first force to a first side of a compressible object (124) from a first rivet gun (12, 120);
1.3 aligning a second rivet gun (14, 122) with said first rivet gun (12, 120) on a second side of said compressible object (124);
1.4 applying a second force from said second rivet gun (14, 122) to said second side;
1.5 triggering said first rivet gun (12, 120);
1.6 synchronizing said first rivet gun (12, 120) and said second rivet gun (14, 122); and
1.7 impacting said compressible object (124);
characterized by:
1.8 comprising between said step of applying a second force to said second side and said step of triggering said first rivet gun (12, 120) the further steps of:
1.8.1 signaling that said first force and said second force are adequate and above a sufficient operational force threshold; and
1.8.2 signaling said first rivet gun (12, 120) that said second rivet gun (14, 122) is activated."

Claim 1 of auxiliary request 1, corresponding to granted claim 7, reads as follows:

"A rivet gun system (10, 110) comprising:
- a first rivet gun (12, 120) comprising a first die (18, 112, 65), said first rivet gun (12, 120) further comprising a first force sensor (21, 86)

- a second rivet gun (14, 122) comprising a second die (17, 114, 65), said second rivet gun (14, 122) further comprising a second force sensor (23, 86)
- said rivet gun system further comprising a force sensor electronics controller (24) adapted to receive said first force signal and said second force signal characterized in that:
- said first force sensor is adapted to detect a first force applied to said first die (18);
- said first rivet gun (12, 120) further comprising a first operator signal device;
- said second force sensor is adapted to detect a second force applied to said second die (17, 114);
- said second rivet gun (14, 122) further comprising a second operator signal device; and
- said first force sensor electronics controller (24) is adapted to activate said first operator signal device and said second operator signal device in response to said first force signal and said second force signal above a sufficient operational force threshold."

VII. The appellant's arguments relevant to the decision may be summarised as follows:

The subject-matter of claim 1 of the main request lacked novelty (Article 54 EPC) over D1. Feature 1.8.1 of claim 1 did not require direct signaling of the forces being adequate, rather indirect signaling would also anticipate this feature. The requirement for the forces to be adequate and above a sufficient operational force threshold was not further defined in the claim, the requirements also amounting to a tautology. It thus followed that any preload force, however small, would satisfy the claimed force requirements. Since the riveting method in D1 worked,

the first and second forces were anyway *de facto* adequate. The passage from col. 7, line 74 to col. 8, line 4 indicated that contact on both sides of the rivet was present in D1 which satisfied the claimed adequacy. From this the skilled person would furthermore understand that the respective dies 202, 203 were not freely floating but must be biased towards the rivet via a chain of mechanical elements from the restoration spring 192 via the coil and conductor plate to the ram stem 204.

As regards auxiliary request 1, the subject-matter of claim 1 lacked an inventive step starting from D1 and combining this with either the teaching of D3 or with the common general knowledge of the skilled person. The features of claim 1 not known from D1 were:
- a first and second force sensor at respectively the first and second die; and
- a force sensor electronics controller.
The objective technical problem could be seen as to provide signaling of proper force application for both guns, as also indicated in para. [0035] of the patent. The claimed solution was obvious to the skilled person from common general knowledge or from D3 which, particularly in col. 9, lines 45 to 51, disclosed a force transducer 152 suitable for measuring the force not only during the firing stroke but equally before firing. The force transducer 134 also monitored forces applied to the rivet prior to upsetting and therefore provided a hint to the claimed solution.
The objective problem formulated by the respondent, based on paragraph [0010] of the patent, was not solved by claim 1 since no features were present addressing a reduction in noise or vibration.

VIII. The respondent's arguments relevant to the decision may be summarised as follows:

D1 failed to disclose features 1.2, 1.4 and 1.8.1 of claim 1. Whilst contact between the dies 202, 203 and the rivet was disclosed, this did not unambiguously imply that a contact force was present; there was certainly no disclosure of a force being applied to the rivet before firing. Even if a force were applied by the dies on the rivet in D1, there was no indication that this would be adequate and above a sufficient operational force threshold. In this respect paras. [0010] and [0003] of the patent description discussed the use of lightweight guns for the invention and for these to be used in riveting large section sheets. These attributes of the claimed method were thus to be used to interpret the 'adequate' and 'sufficient' forces in claim 1 (Article 69(1) EPC). D1 also failed to provide a signal directly relating to the force applied to the rivet. In order for the adequacy of the first and second forces to be ascertained in claim 1, it was implicit that force sensors must be present.

As regards auxiliary request 1, the subject-matter of claim 1 involved an inventive step (Article 56 EPC). The objective technical problem could be seen as reducing noise and vibration without increasing gun size or weight, as was also indicated in para. [0010] of the patent. The claimed force sensors enabled forces applied to the die to be directly measured allowing applied forces to be lower but still adequate. The gun would thus have less recoil from the workpiece during firing thereby reducing noise and vibration.

In D3 the transducer 152 solely measured the force applied to the rivet during upsetting (i.e. impacting)

and thus provided no hint to the claimed solution. An alternative objective problem could be seen as to provide more accurate force signaling to the operator, this problem however also not being solved in an obvious manner when starting from D1 and combining this with the technical teaching from D3.

Reasons for the Decision

1. Main request

1.1 Novelty

The subject-matter of claim 1 lacks novelty with respect to D1 (Article 54 EPC 1973).

1.1.1 D1 (see particularly Figs. 3 to 8; col. 6, line 45 to col. 9, line 43) discloses all features of claim 1, the reference signs in parentheses referring to D1:

A method for riveting comprising:
- applying a first force (col.8, lines 1 to 2) to a first side of a compressible object (201) from a first rivet gun (130);
- aligning a second rivet gun (131; Fig. 3) with said first rivet gun (130) on a second side of said compressible object (201);
- applying a second force (col.8, lines 2 to 4) from said second rivet gun (131) to said second side;
- triggering said first rivet gun (130; col. 9, lines 39 to 43);
- synchronizing (col. 9, lines 32 to 36) said first rivet gun (130) and said second rivet gun (131); and
- impacting said compressible object (201);
wherein

- comprising between said step of applying a second force to said second side and said step of triggering said first rivet gun (130) the further steps of:
- signaling (via lights 176, 177) that said first force and said second force are adequate and above a sufficient operational force threshold (col. 8, lines 1 to 4); and
- signaling (via switch 301; col. 9, lines 32 to 33) said first rivet gun (130) that said second rivet gun (131) is activated.

1.1.2 The respondent's argument that contact forces between the dies and the rivet were not disclosed and were not unambiguously present in D1 is not accepted. Whilst it is true that col. 7, line 74 to col. 8, line 4 simply cites 'contact' between the dies 202, 203 and the rivet, from a technical viewpoint it is unreasonable to conclude that at least a minimal force is not exerted on the rivet by each die. Indeed, if no force at all were applied and yet contact between the dies and rivet were somehow to be achieved, the rivet gun operators would be required to position the guns with such infinite precision perpendicularly to the workpiece (in the direction of the axis of the rivet) so as to compress the o-ring seals 216 just enough to prevent escape of the alignment pressure medium and yet to provide contact with, but no force on, the rivet from the dies. This would clearly require an unreasonable level of accuracy in positioning the guns along the direction of the axis of the rivet. It thus follows that, in order for the dies to contact the rivet, as indicated to occur in D1, implicitly also at least a minimal force must be applied from the dies onto the rivet.

1.1.3 Contrary to the opinion of the respondent, the Board finds that the above identified forces applied from the dies to the rivet in D1 also meet the requirement in claim 1 of being 'adequate and above a sufficient operational force threshold'. In this respect it is noted that the expressions 'adequate' and 'above a sufficient operational force threshold' are not further defined in the claim or the description. The respondent referred to para. [0012] of the patent in which 'counteractive force operation' is indicated as a benefit of sufficient pressure being applied, although even this does not provide any concrete point of reference enabling the magnitude of the applied forces to be ascertained. The respondent further conceded that the expressions 'adequate' and 'above a sufficient operational force threshold' were indeed describing one and the same condition for the first and second forces, and the Board agrees since the expressions 'adequate' and 'sufficient' are not further limited. The Board thus concludes that the expressions 'adequate' and 'above a sufficient operational force threshold' define forces appropriate for the upsetting of the rivet to proceed. This condition is also unambiguously reached in D1 once the dies contact the rivet since upsetting the rivet can then be initiated.

1.1.4 The respondent's contention that claim 1 implicitly included the presence of force sensors, and that these were not known from D1, is not convincing. Due to no measurement of the first and second forces being required in order to establish that these are 'adequate and above a sufficient operational force threshold' (see point 1.1.3 above), an implicit presence of force sensors is not included in claim 1.

Although the respondent further argued that the adequate force should be seen in relation to paragraph [0010] of the patent relating to lightweight guns, as was even present in an embodiment described in paragraph [0025], the Board does not accept this argument because claim 1 is not limited in any way to 'lightweight' rivet guns and such are also not implicit from the claim itself, which is notably directed broadly to a method of riveting without any further details of the weight of the guns to be used or e.g. the materials to be riveted which might in some way perhaps imply weight considerations. The same applies to the respondent's further arguments where it contended that the claimed invention should be suitable for riveting large section sheets as mentioned in paragraph [0003], since such sheets are simply not included in claim 1.

In this regard, the respondent also argued that claim 1 should be read in the light of the description since Article 69(1) EPC should be used to interpret the claims, whereby such limitations would then be present. However, Article 69 EPC concerns the extent of protection conferred which is not an issue in the present case, not least since the claims are clear on reading them alone. Even if reference were to be made to the description for some particular reason, and no reason was given as to why this should be the case, there is anyway nothing stated there which the Board regards as limiting the invention necessarily to a particular weight of gun, size of sheet or any other feature not in the claim.

1.1.5 The respondent's further argument that D1 failed to anticipate a signal which directly related to the force applied to the rivet was not decisive. It is noted that

feature 1.8.1 of claim 1 simply requires 'signaling that said first force and said second force are adequate and above a sufficient operational force threshold'; there is no requirement for this signal itself to be directly related to measurement of the forces applied. In other words, signaling that the forces are adequate without any direct measurement of the forces is also encompassed by the claimed feature, as long as the signaling occurs when the forces are indeed adequate. It is also just such indirect signaling of adequate force which is disclosed in D1 by way of the alignment lights 176, 177 which, when lit (thus providing the claimed 'signaling'), therefore implicitly signal that first and second forces are being applied to the rivet, which forces, since upsetting the rivet is performed only after this condition is established, are adequate (see 1.1.3 above). Feature 1.8.1 is thus also known from D1.

1.1.6 The respondent did not contend that any other features of claim 1 were not known from D1. It thus follows that all features of claim 1 are known from D1 such that its subject-matter lacks novelty (Article 54 EPC 1973). The main request is therefore not allowable.

2. Auxiliary request 1

2.1 Inventive step

The subject-matter of claim 1 involves an inventive step (Article 56 EPC 1973).

2.1.1 As also conceded by both parties, only the following features of claim 1 are not disclosed in the third embodiment of D1 (see Figs. 3 to 8; col. 6, line 45 to col. 9, line 43):

- a first and second force sensor adapted to detect a first and second force applied to respectively the first and second die; and
- a force sensor electronics controller.

2.1.2 Based on these distinguishing features, the objective technical problem can be seen as the provision of alternative means for providing signaling during set-up.

The appellant's suggested technical problem of 'signaling proper force application for both guns' is not objective based on the distinguishing features of claim 1 over D1. It cannot be held that D1 does not implicitly signal 'proper' force application too, allowing upsetting of the rivet to be initiated, since a signal is produced (via alignment lights 176, 177) and, at this time, first and second forces will be above a sufficient operational force threshold (see point 1.1.3 above); proper force application is thus already signaled by D1 such that this aspect cannot be included in a truly objective technical problem.

The respondent's suggested technical problem of 'reducing noise and vibration without increasing gun size and weight' can also not be regarded as objective. Despite para. [0010] of the patent identifying this as one of the advantages of the claimed riveting technique, there are no features present in claim 1 relating to the size or weight of the rivet gun. As such the suggested problem can thus not be regarded as objective.

The respondent's alternative technical problem of 'allowing more accurate force signaling to the operator' is also not truly objective. There is no

basis for asserting that the system according to claim 1 would allow more accurate signaling than that disclosed in D1. Claim 1 simply states that the operator signal devices are activated when the force signal is above a sufficient operational force threshold; this force threshold is however not defined and, as found with respect to D1 in point 1.1.3 above, the equivalent threshold is also exceeded in D1 for the rivet upsetting to be initiated. No greater accuracy of force signaling can thus be recognised in claim 1 over that in D1 such that this cannot provide a basis for an appropriate objective technical problem.

As regards formulating an appropriate objective technical problem this should reflect the aim of modifying or adapting the closest prior art to provide the technical effects that the invention as claimed provides over the closest prior art. In the present case, however, the technical effect of the distinguishing features, i.e. identifying when the forces on the dies have exceeded the sufficient operational force threshold, are achieved also in D1 albeit through different means. The objective technical problem formulated by the Board thus appropriately reflects this through seeking 'alternative means for providing signaling during set-up'.

2.1.3 Starting from the third embodiment of D1 and faced with the above objective technical problem, neither the skilled person's common general knowledge nor the teaching of D3 leads the skilled person to the subject-matter of claim 1.

As regards the skilled person's common general knowledge, nothing would guide the skilled person to modify the rivet gun system of D1 through the provision

of force sensors and a force sensor electronics controller; indeed, the system of D1 functions perfectly well without force sensors. The appellant produced no information showing that this was part of the skilled person's general knowledge. Without any hint guiding the skilled person to considering the use of force sensors, he would not find the consideration of these as obvious in his search for alternative means for providing signaling.

As regards the teaching of D3, col. 9, line 45 to col. 10, line 48 discloses a transducer 152 used to measure the upsetting force experienced by the rivet during the upsetting process. However, D3 fails to disclose the transducer being used in the set-up period prior to firing of the rivet gun such that the skilled person also receives no hint from this document to provide such a force sensor for assisting in the setting-up of the rivet gun prior to firing. The appellant's suggestion that the skilled person would consider the force transducer also for setting-up of the system prior to firing is unconvincing. D3 is primarily concerned with measurement of forces on the rivet as it is impacted with the anvil, no mention being made of the transducer being used for force measurement prior to upsetting. The assertion of the appellant appears to be motivated through knowledge of the invention defined in claim 1, i.e. through hindsight, rather than through a hint or teaching of the claimed solution provided in D3.

2.1.4 In its written submissions the appellant referred to force transducer 134 used to monitor forces applied prior to upsetting the rivet. The transducers 134 do indeed monitor forces applied prior to upsetting, however they measure the forces applied to each side of

the workpieces 14, in order to ensure that their movement may be minimised (see col. 7, line 46 to col. 8, line 21). The transducers 134 are thus not capable of monitoring set-up forces on the rivet itself and consequently provide no hint to the modification of D1 in order to reach the claimed subject-matter.

2.1.5 In summary, therefore, the Board is not persuaded by any of the appellant's arguments that the subject-matter of claim 1 would be reached, without inventive skill, when starting from D1 and combining this with the common general knowledge of the skilled person or the technical teaching of D3.

2.1.6 During the oral proceedings before the Board the appellant explicitly withdrew its previous objections based on D10 (US-A-3 704 506). No further arguments were submitted questioning the presence of an inventive step in the subject-matter of claim 1 of auxiliary request 1.

2.1.7 The subject-matter of claim 1 thus involves an inventive step (Article 56 EPC 1973).

2.2 No objections were raised to the description which was adapted to be in accordance with the invention defined in the claims of auxiliary request 1, nor has the Board found any reason to raise objection to these.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent as amended in the following version:

Claims: 1 to 8 of auxiliary request 1 filed during the oral proceedings of 7 January 2016.

Description: pages 2, 3 and 5 filed during the oral proceedings of 7 January 2016; pages 4 and 6 of the patent specification.

Drawings: Figures as granted.

The Registrar: The Chairman:

M. H. A. Patin M. Harrison

Decision electronically authenticated